RESPIRATORY MEDICINE

REVIEW

Quality of life and functional parameters in patients with chronic obstructive pulmonary disease (COPD): an update

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Quality of Life (QoL) varies with severity of the disease in patients with chronic obstructive pulmonary disease (COPD) as assessed in terms of FEV_1%pv. Specific measures of QoL, e.g. S. George Respiratory Questionnaire (SGRQ)(1) progressively deteriorate with increase in the disease severity from stages I to III (2). Contrary to expectations, even patients with mild disease exhibited substantial compromise in QoL. Also, the difference in SGRQ scores between patients without co-morbid and with co-morbid conditions were evident mostly in stage I disease and much less in stages II and III. In general, however, the coefficient of relationship between FEV_1 and SGRQ scores ranged from 0·2 to 0·4 with a mild increase being evident in patients without no co-morbidity,(2).

In a multivariate analysis, FEV_1 and to a lesser extent well-being scores were found to be the most significant independent predictors of survival in COPD (3). By applying factor analysis Wegner *et al*. (4) were able to find that QoL along with BDI and 6mWD were loading variables on symptom factor while both obstruction and hyperinflation identified other factors which independently characterized the clinical conditions of COPD patients.

In a contemporaneous study Tsukino *et al*. (5) individuated three different defined factors: airflow limitation, diffusing lung capacity (DLCO) and vital capacity. They noticed a mild level of relationship between factors and components of CRQ questionnaire (6). In the same study the logistic regression indicated that an increase in FEV_1 of 10% reduced the risk of having disturbances in the dyspnoea dimension of CRQ by 31% and the mastery dimension by 41%. Also, an increase in DLCO reduced the risk of the dimension of fatigue by 18% and smoking habits increased the risk of both dyspnoea and fatigue.

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Nonetheless, a longitudinal study (7) indicated that changes in dyspnoea, airway obstruction and health status provided independent but complementary information about the conditions of COPD. In that study (7) improvement in transitional dyspnoea index (TDI) focal score was associated with a variable increase in physical functioning ,health perception, role and social functioning components of Medical Outcomes Study (MOS), and decrease in mental health and pain components. Similarly, a unit increase in FEV_1 improved almost all the components.

In a 1 yr survey study Seemungal *et al*. (8) reported the association of SGRQ total score with exacerbation frequency, MRC and daily wheezing. The latter, along with past exacerbation, predicted the frequency of exacerbations (8). Thus the relationship between the healthy status with frequency of exacerbations contributes to individuate patients at risk of exacerbations and disability.

Reports obtained in selected patients who underwent lung volume reduction surgery (LVRS) have shown good associations between changes in exercise capacity and some dimensions of generic measures of QoL (9). The study also shows that 6mWT and exercise capacity measure different outcomes, with the first assessing social activity and the second assessing physical performance. A significant relationship between improved general sickness impact profile (SIP) scores and change in O_2 cost of breathing from baseline to maximal work load after 3 months LVRS has been recently reported by Leyenson *et al*. (10) and by Yousen (11). In a long-term follow up (12) the SIP scores were lower at 3 months and were sustained, in association with an improved in forced vital capacity.

Pulmonary rehabilitation programs (PRP) improved the physical performance and disease specific measures in three groups of patients with mild, moderate and severe COPD (13). Importantly, there were similar improvements in maximum work capacity and maximum

oxygen uptake at each stage of COPD accompanied by improvements in physical function and QoL (13). The study by Foglio *et al*. (14) shows that PRP may be effective on SGRQ: with an effect lasting longer than that on exercise capacity (6mWT). Importantly, the group of improvers and non improvers to PRP did differ in terms of baseline SGRQ total scores and baseline dyspnoea index (BDI) but not in pulmonary function. On the other hand, improvement in QoL as assessed by disease generic questionnaires (SF-36) appears not to be associated with amelioration of functional capacity (15). Furthermore, in patients with severe emphysema, there was no relationship between changes in FEV_1 and changes in the scores of a generic questionnaire of QoL (SF-36) after PRP, and only partial after LVRS (16). In contrast, the association of both treatments was characterized by positive even if weak relationships between changes in FEV_1 and changes in the domains of physical functioning, social functioning and vitality of SF-36 (16).

It has been recently shown that there are not significant differences between SGRQ and chronic respiratory questionnaire (CRQ) in their correlations with physiological parameters, exercise capacity and assessment of dyspnoea (17).

Finally, not in line with a previous study carried out by applying generic questionnaires of QoL (18), Sanchez *et al*. (19) have found that targeted inspiratory muscle training 6 days a week for 6 months improves each category of CRQ, relieves dyspnoea and increases the capacity to walk at 6 months.

In turn, given the weakness of the relationships between health related quality of life (HRQL) measures and functional data (20–23), a message is clear: for patients with COPD measures of QoL provide information above and beyond that provided by measures of lung function or exercise performance. Thus, QoL assessment should be an integral part of the conduct and interpretation of clinical studies (11).

REFERENCES

1. Jones PW, Quirk FH, Baveystock CM, Littlejohns P. A self-complete measure of health status for chronic airflow limitation. The St. George's Respiratory Questionnaire. *Am Rev Respir Dis* 1992; **145:** 1321–1327.
2. Ferrer M, Alonso J, Morera J, *et al*. Chronic obstructive pulmonary disease stage and health- related quality of life. *Ann Intern Med* 1997; **12f:** 1072–1079.
3. Ries AL, Kaplan RM, Limberg TM, *et al*. The effects of pulmonary rehabilitation on physiologic and psychological outcomes in patients with chronic obstructive pulmonary disease. *Ann Intern Med* 1995; **122:** 823–832.
4. Wegner RE, Jörres RA, Kirsten DK, Magnussen H. Factor analysis of exercise capacity, dyspnoea ratings and lung function in patients with severe COPD. *Eur Respir J* 1994; **7:** 725–729
5. Tsukino M, Nishimura K, Ikeda A, Koyama H, Mishima M, Izumi T. Physiologic factors that determine the health-related quality of life in patients with COPD. *Chest* 1996; **110:** 896–903.
6. Guyatt G, Townsend M, Berman L, Pugsley S. Quality of life in patients with chronic airflow limitation. *Br J Dis Chest* 1987; **81:** 45–54.
7. Mahler DA, Tomlison D, Olmstead EM, Tosteson ANA, O'Connor GT. Changes in dyspnoea, health status, and lung function in chronic airway disease. *Am J Respir Care Med* 1995; **151:** 61–65.
8. Seemungal TAR, Donaldson GC, Paul EC, Bestall JC, Jeffries DJ, Wedzicha JA. Effect of exacerbation on quality of life in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 1998; **157:** 1418–1422.
9. Ferguson GT, Fernandez E, Zamora MR, *et al*. Improved exercise performance following lung volume reduction surgery for emphysema. *Am J Respir Crit Care Med* 1998; **157:** 1195–1203.
10. Leyenson V, Furukawa S, Kuzma A, *et al*. Correlation of changes in quality of life after lung volume reduction surgery with changes in lung function, exercise, and gas exchange. *Chest* 2000; **118:** 728–735.
11. Yusen RD. What outcomes should be measured in patients with COPD? *Chest* 2001; **119:** 327–328.
12. Cordova F, O'Brien G, Furukawa S, Kuzma AM, Travaline J, Criner GJ. Stability of improvements in exercise performance and quality of life sollowing bilateral lung volume reduction surgery in severe COPD. *Chest* 1997; **112:** 907–915.
13. Berry MJ, Rejeski WJ, Adair NE, Zaccaro D. Exercise rehabilitation and chronic obstructive pulmonary disease stage. *Am J Respir Crit Care Med* 1999; **160:** 1248–1253.
14. Foglio K, Bianchi L, Bruletti G, Battista L, Pagani M, Ambrosino N. Long-term effectiveness of pulmonary rehabilitation in patients with chronic airway obstruction. *Eur Respir J* 1999; **13:** 125–132.
15. Boueri FM, Bucher-Bartelson BL, Glenn KA, Make BJ. Quality of life measured with a generic instrument (Short Form-36) improves following pulmonary rehabilitation in patients with COPD. *Chest* 2001; **119:** 77–84.
16. Moy ML, Ingenito EP, Mentzer SJ, Evans RB, Reilly JJ, Jr. Health-related quality of life improves following pulmonary rehabilitation and lung volume reduction surgery, *Chest* 1999; **115:** 383–389.
17. Hajiro T, Nishimura K, Tsukino M, Ikeda A, Koyama H, Izumi T. Comparison of discriminative properties among disease-specific questionnaire for measuring health-related quality of life in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 1998; **157:** 785–790.
18. Larson JL, Kim MJ, Sharp JT, *et al*. Inspiratory muscle training with a pressure threshold breathing device in patients with chronic obstructive pulmonary disease. *Am Rev Respir Dis* 1988; **138:** 689–696
19. Sanchez Riera H, Montemayor Rubio T, Ortega Ruiz F, Cejudo Ramos P, Del Castillo Otero D, Elias Hernandez T, Castillo Gomes J. Inspiratory muscle training in patients with COPD. Effect on dyspnoea, exercise performance, and quality of life. *Chest* 2001; **120:** 748–756.
20. Curtis JR, Deyo RA, Hudson LD. Health related quality of life among patients with chronic obstructive pulmonary disease. *Thorax* 1994; **49:** 162–170.
21. Guyatt G, Townsend M, Keller J, Singer J, Nogradi S. Measuring functional status in chronic lung disease: conclusions from a randomized control trial. *J Respir Med* 1989; **83:** 293–297
22. McGavin C, Artvinli M, Naoe H, McHardly G. Dyspnoea, disability, and distance walked: comparison of estimates of exercise performance in respiratory disease. *Br Med J* 1978; **2:** 241–243.
23. Guyatt G, Thompson P, Berman L, *et al*. How should we measure function in patients with chronic heart and lung disease. *J Chronic Dis* 1985; **38:** 517–524.